

130B-1

SAFETY PRACTICES IN THE SHOP

130-B

UNIT OBJECTIVE

After completion of this unit, students will be able to identify the importance of safety in the scope the agricultural mechanics industry in the United States, Idaho, and the local community. This knowledge will be demonstrated by completion of assignment sheets and a unit test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES AND COMPETENCIES

After completion of this unit, the student should be able to:

1. Recognize and report hazardous situations.
2. Develop a proper attitude toward use of safety glasses and coveralls.
3. Develop a proper attitude toward work and avoid unsafe practices.
4. Practice all shop and equipment safety regulations.
5. Use a fire extinguisher properly.
6. Make and keep a folder containing Material Safety Data Sheets.

SAFETY PRACTICES IN THE SHOP

A. Introduction:

The most frequent cause of injuries and accidents in agriculture comes from the use of tools and machinery. Forty-four percent of all agriculture-related injuries occur while using farm machinery. Most of these accidents and injuries can be prevented through the development of safe work habits. The school agricultural mechanics shop is a good place to develop these safe habits.

B. Setting Up a Safe Agricultural Mechanics Shop

1. Install all machinery according to the manufacturer's directions.
2. Provide proper storage for all tools, equipment, material, scraps, flammable liquids, chemicals, and waste materials.
3. Keep all tools and equipment fitted and adjusted properly.
4. Remove all damaged tools and equipment from the shop or to a place where they cannot be accidentally picked up and used.
5. Provide proper orientation and practice to anyone who is going to use a particular piece of equipment.
6. Keep all moving parts of machinery properly shielded.
7. Keep working areas free of clutter, grease, dirt, and un-needed tools.
8. Avoid placing or storing objects where they might fall. Mark any area where an object may fall.
9. Protect the eyes, face, hands, and body with protective clothing and gear.
10. List safety precautions for all equipment and tools. (See safety sheets on pages 130B-14 through 130B-38)

C. Color marking systems are used to help shop users be alert to danger or hazards, to help people locate certain objects, or to help people react quickly during an emergency.

1. Red is used to signify danger. Red tape or paint should be placed around all equipment or areas that are to be identified as items of danger or emergency.
2. Orange is used to mark off areas where machine hazards are likely. This color is designated to mark off a safe working distance or an area in the flight path of moving parts.
3. Yellow is the color used to designate caution. Yellow and black stripes are often used to mark stairs and other stationary objects where a hazard may occur.
4. Green indicates the presence of safety equipment, safety areas, or first aid kits.

130B-3

5. Purple is used to signify radioactivity. This is not a problem in most agricultural mechanics shops, but some chemicals may be used where radioactive isotopes are present.
6. Gray is used to signify all work areas and usable machinery. Most shop floors are also painted gray because it is a restful color and it contrasts well with all other safety colors.
7. White, or white and black stripes are used to mark traffic pathways within the shop.
8. Blue is used as a background color if information is to be provided. Signs such as 'Out of Order' are written in white lettering on a blue background.

D. Protective clothing and gear can reduce the amount of injuries in the shop. Many accidents are caused by flying debris or contact with moving equipment. Thirty-six percent of all accidents in the shop occur to the arms and hands, ten percent occur to the head, and twenty-five percent of all injuries occur to the body. Proper use of protective clothing and gear can minimize or prevent these injuries.

1. Safety goggles or glasses should be worn in the shop at all times. They should be equipped with impact resistant lenses.
 - a. Tinted eye protection must be worn when welding. Separate tints are required for arc and gas welding in order to prevent burns to the eyes.
 - b. A face shield is required where flying debris is a problem. Grinders, planers, and power saws are examples of equipment that cause flying debris.
2. Headgear is used to restrain long hair and protect the head from falling objects. Woolen hats, headbands, and hairnets are acceptable to prevent long hair from coming in contact with moving parts, chemicals, or an open flame. Hard hats are required when falling objects may be a hazard.
3. Protective clothing is used to keep the body safe from injuries. Such clothing should fit properly and have no loose cuffs, strings, or ties that may get caught in machinery. The clothing should also be fire resistant and be tough enough to protect the body from scrapes and abrasions. Several types of protective clothing are available.

- a. Coveralls are very popular because they cover the entire body as well as the legs and arms. Pockets are also an advantage of coveralls. Care should be taken to prevent any loose strings or cuffs on the coveralls. All buttons and zippers should have a protective flap and care should be taken to prevent ripped pockets from getting caught in moving machinery.
 - b. Aprons are often used to protect the body while welding. The leather apron prevents sparks from reaching the body. The disadvantage of aprons is that they require a string to tie them on, which is a hazard when working around moving parts. Aprons protect the body well, but do not provide protection to the arms and legs.
 - c. Shop coats are a good medium between coveralls and aprons. They protect both the body and arms and still have pockets to hold small tools. Zippers and buttons should have a protective flap to prevent electric shock or catching in moving parts. The shop coat is also the easiest body protection to put on and is often cheaper than coveralls.
4. Proper footwear is also important when working in the shop. Open toed footwear must NEVER be worn in the shop. Leather shoes with steel reinforced toes provide excellent protection. Leather is fire resistant and tough enough to resist the impact of many falling objects.
 - a. Rubber boots are required when working in water or when using pesticides. These boots are also ideal when doing concrete work due to their resistance to water and the ease with which they can be cleaned.
5. Gloves can be both protective devices and safety hazards in the shop. Gloves are used to keep the hands warm and to protect them from abrasion, heat, and chemicals. Gloves are excellent protection when using tools that emit flying debris, such as grinders and chainsaws. Caution should be taken when wearing gloves around moving parts. Gloves can easily be pulled into the machines and serious injury can result. It is not advisable to wear gloves where the hands will come in close contact with the moving parts of a machine.
6. Ear plugs or earmuffs are ideal when working around noisy machinery. Some machines, such as planers, emit a very high pitched sound that can damage the inner ear if protection is not worn.
7. Masks and respirators should be worn when using machines that produce large amounts of dust. Application of chemicals also requires the use of a respirator.

E. Uncontrolled fires in an agricultural mechanics shop can spread very rapidly, causing death, serious injury, and the destruction of property and equipment. Since all shops contain flammable materials, students should be informed of the causes of fires, methods of preventing fires, and the extinguishing of fires, as well as emergency procedures when a fire occurs.

1. Causes of Fires in the Shop

- a. Fire occurs only when three factors are combined. These are fuel, oxygen, and heat. The absence of any one of these factors will prevent a fire.
 - 1) Fuel consists of any combustible material. Any common material in the shop from old rags to grease and oil can act as the combustible. All combustible materials must be properly stored to prevent the dangers of fire.
 - 2) Heat is required to ignite the combustible. Heat can be provided from many sources in the shop including open flames, electric sparks, or high friction heat.
 - 3) Oxygen must be present in order for fuels to burn. The absence of oxygen will prevent a fire or put one out. Storing combustibles in airtight conditions will prevent fires. Care must be taken when using airtight combustible containers to avoid the buildup of high pressure. A puncture to the container with all three factors present can cause a serious explosion.

2. Preventing Fires in the Shop

- a. Familiarizing oneself with the factors involved in starting a fire can help lead to better prevention. The absence of any one of the factors described above will prevent a fire from starting, or put one out if it has already started. There are many safety precautions that can be taken in the shop to prevent the combination of fuel, heat, and oxygen.
 - 1) Store fuels only in approved containers. These containers should be made of metal and ideally equipped with doors that seal automatically in the presence of fire.
 - 2) Store fuels in a separate area from other flammable materials such as wood and paper.

- 3) Keep the shop environment at a cool temperature with all areas being well below the combustion temperature of all materials. Most chemicals and liquid fuels will have data which label the combustion temperature and safe storage temperature range.
- 4) Use fires only in areas that are designated safe for that purpose. (Forge, cutting torch, etc.)

3. Extinguishing Fires in the Shop

- a. Fires are extinguished by removing any one of the three factors listed above. Different types of fires require different methods to extinguish them. Fires are categorized according to the type of fuel they burn. These classes of fires must be known in order to correctly extinguish all types of fires in the shop.
 - 1) Class A fires are termed as ordinary combustibles. These fires burn fuels such as wood, paper, and trash; they do not involve any liquid fuel or electricity. Such fires can easily be contained by smothering them, using water to cool them, or by removing the unburned fuel and letting the fire burn itself out.
 - 2) Class B fires are those that utilize flammable liquids for fuel. These fires are more difficult to extinguish and can be much more dangerous than class A fires.
 - 3) Class C fires involve electrical equipment. This type of fire not only has the risk of burning and smoke inhalation, but also of electrocution.
 - 4) Class D fires involve combustible metals. Very few metals will burn. Burning metals are very difficult to put out and require a Class D fire extinguisher in order to quench them.
- b. The fire classifications are based on how cheaply and easily the fires can be extinguished. Class A fires can be extinguished safely using water. Water is the cheapest and easiest fire retardant to apply. In some situations, such as in electrical fires, water is not safe to use due to the chance of electrocution.
- c. Fire extinguishers vary as do the types of fires. Each fire extinguisher is labeled with the types of fires it can put out. Symbols are used to indicate each type of fire extinguisher.

- 1) The green triangle is used to designate fire extinguishers that can put out ordinary combustible fires.
- 2) A red square is designates Class B fires which involve flammable liquids.
- 3) Electrical equipment fires can be extinguished with a fire extinguisher labeled with a C surrounded by a blue circle.
- 4) Combustible metal fires are extinguished by a fire extinguisher that has a yellow star symbol with a D in the center.

d. Fire extinguishers have a variety of different ingredients, depending on their capabilities.

- 1) Extinguishers containing water that are powered by pump or gas pressure can be used on Class A fires only.
- 2) Carbon dioxide gas extinguishers are useful on both Class B and Class C fires.
- 3) Dry chemical extinguishers can be used on Class A, B, and C fires.
- 4) Fire extinguishers that emit foam are to be used on Class A and Class B fires only.
- 5) Class D fire extinguishers contain special chemicals that can extinguish combustible metal fires.

e. Fire extinguishers should not be used on humans and animals unless absolutely necessary. A blanket is used to smother fires on humans and animals.

f. Using a fire extinguisher involves three easy steps.

- 1) Locate the fire extinguisher and remove it from its holder. Hold the fire extinguisher upright and pull the ring pin.
- 2) Start back ten feet from the flames and aim the nozzle at the BASE of the fire.
- 3) Squeeze the lever and sweep the nozzle in a side-to-side motion across the base of the fire.

g. Shop students should have a lesson on the types of fires, the capabilities of the fire extinguishers in the shop, the location of the fire extinguishers, and the methods of using them.

h. Each fire extinguisher should be checked at least once a month to assure that it will be usable in case of an emergency.

F. Regardless of the safety precautions taken by the instructor, accidents continue to occur in the shop. Most of these accidents can be prevented if each student develops safe working habits. Many simple shop rules can lead toward the development of a sense of the importance of safe shop procedures.

1. Discourage horseplay in the shop. Shop work requires the undivided attention of the worker if a task is to be performed safely for everyone in the shop. 'Playing around' distracts from this safe attention.
2. Have students report any hazard to the instructor immediately. Many accidents occur because students believe that the instructor already knows about a hazard.
3. Have each student read the safety signs on equipment before using it and warning labels on all chemicals or materials to be used.
4. Have a safety orientation with the students regarding the placement of safety equipment, the school's safety procedures and each student's responsibility in the event of an accident.
5. Enforce all shop safety regulations at all times. Leniency often leads to ignorance of the rules when it comes to shop safety.

G. Safety Signs

1. Post safety signs on each piece of equipment and at the storage area for portable tools. (Signs are provided in this chapter)
2. Students will understand all safety procedures on the signs before using the equipment.
3. Students will follow all the safety rules posted on the signs while using the equipment.

H. Material Safety Data Sheets (MSD)

1. Idaho schools with the Resource Conservation and Recovery Act, the Idaho Hazardous Waste Management Act, and other federal and state laws, rules and regulations which pertain to inventory, use and disposal of hazardous materials and hazardous wastes.
2. In complying with this law, Ag Departments are required to keep a MSD sheet on any hazardous material including; used oil, paint thinner, etc.
3. Check with your local school district, each district might have a different policy.

ACTIVITY:

1. Conduct a shop safety tour with the class.
2. Use slides, videos, and films to illustrate the importance of shop safety.
3. Conduct practice emergency drills to assess student performance in case of an accident.
4. Have students sign written contracts wherein they agree to abide by all the safety procedures; posted or un-posted rules, in the shop. (Page 130B-13)
5. Photo copy and post safety signs (Pages 130B-14 through 130B-38) on shop equipment.

References:

Cooper, Elmer L. (1997). AGRICULTURAL MECHANICS: FUNDAMENTALS AND APPLICATIONS, 3ed EDITION. Albany, NY: Delmar Publishers.

Phipps, Lloyd J., and Miller, Glen M.(1998) AGRISCIENCE MECHANICS. Danville, IL: Interstate Publishing

Burke, Stanley R., and Wakeman, T. J. (1990) MODERN AGRICULTURAL MECHANICS, 2ed EDITION. Danville, IL: Interstate Publishing

Resources:

UTAH SAFETY COUNCIL
5263 SOUTH 300 WEST, SUITE 201
SALT LAKE CITY, UTAH 84107
1-800-933-5943

University of Idaho, Environmental & Health Safety
1-888-884-3246 ext. 6524

Special Materials and Equipment:

Fire extinguisher; layout of the shop, including safety exits; videos and films on safety practices in the shop.

Name _____
Date _____

1. What area of agriculture sees the greatest number of injuries and accidents?
2. What precautions can be taken to prevent accidents in the agricultural mechanics shop?
3. List and describe at least two building requirements that assure a safe agricultural mechanics shop.
4. Color coding is used in the shop to:
 - a. make tools easier to find
 - b. add color to an otherwise dull shop
 - c. alert people to dangers and hazards
 - d. all of the above
5. Which color is used to signify danger?
 - a. Red
 - b. Gray
 - c. Blue
 - d. Brown
6. Accidents among farmworkers most often involve:
 - a. burns
 - b. machinery
 - c. drowning
 - d. falls
7. Flammable liquids and dirty rags must be disposed of by:
 - a. throwing them in the trash
 - b. flushing them down the drain
 - c. burning them in a safe area outside of the shop
 - d. placing them in special metal containers that close in the presence of fire

8. Lumber and metal material should be stored:

- a. in a storage closet
- b. in vertical racks
- c. in any available corner of the shop
- d. in the overhead rafters

9. Tools are silhouetted in the tool cabinet in order to:

- a. make tools easier to locate
- b. easily identify missing tools
- c. allow the tool cabinet to be neatly organized every time the tools are returned
- d. all of the above

10. Which of the following can be used to extinguish a fire?

- a. Fuel
- b. Oxygen
- c. Water
- d. Heat

11. List and describe the four types of fires. What are the symbols and colors that designate each type?

12. Which of the following is classified as protective clothing?

- a. Coveralls
- b. Apron
- c. Lab coat
- d. All of the above

13. List the three steps involved in using a fire extinguisher.

14. What type of fire will a fire extinguisher containing water be useful on?

- a. Class A
- b. Class B
- c. Class C
- d. All of the above

ANSWER SHEET

1. The use of tools and machinery.
2. Development of safe work habits.
3. Any thing listed in Section B of this unit.
4. C
5. A
6. B
7. D
8. B
9. D
10. C
11. Class A – Green triangleClass B – Red squareClass C – C surrounded by a blue circleClass D – Yellow star with a D in the center
12. D
13. 1) Locate the fire extinguisher and remove it from its holder. Hold the fire extinguisher upright and pull the ring pin.
2) Start back ten feet from the flames and aim the nozzle at the BASE of the fire.
3) Squeeze the lever and sweep the nozzle in a side-to-side motion across the base of the fire.
14. Class A

SAFETY CONTRACT

1. I understand that eye protection needs to be worn correctly in the shop at all times without exception.
2. I will follow all safety procedures at all times without exception.
3. I understand that loose clothing, loose jewelry, including rings of any kind, long hair (not in a ponytail), and neckties (not protected by coveralls) can be dangerous in the shop and should not be worn.
4. I understand that Safety Signs are to be understood before using the equipment and the safety procedures are to be followed during its' use.
5. I understand that protective clothing is an important part of shop safety and that clean coveralls and leather boots should be worn at all times (especially in welding and agricultural fabrication).
6. I understand that horseplay is never allowed in the shop and can cause serious injury to myself and to other students around me.
7. I will report all accidents, no matter how minor.
8. I understand that cleaning the shop at the end of each class period is an important part of shop safety and I will participate at the end of every class or whenever it is needed.
9. I understand that running is never allowed in the shop at any time.
10. I understand that all tools and equipment, welding electrodes, steel, wood, and grease rags are to be stored properly.

Failure to comply with this safety contract can and will result in detentions, parent-teacher conferences, and/or expulsion from this class and any other shop class you are currently in and you will be kept out of any other shop classes in the future for safety and liability reasons.

Parent's Signature _____ Student's Signature _____

Instructor's Signature _____

Date _____

ACETYLENE WELDER

Do not operate this machine until you have received instructions on its proper use and you understand all items on this sign.

1. Use proper shade lenses - shade 5 to 7
2. Assume that all metal is Hot in this area
3. Always chain cylinders to cart, bench, or walls
4. Keep oil and grease away from oxygen cylinders and equipment. Oil or grease burns violently in the presence of oxygen.
5. Test connection for leaks frequently with soap and water
6. Keep area clear of combustible materials
7. Stand on one side of gauges when opening cylinder valves
8. Never use a match to light the torch
9. Do not walk with a lighted torch or lay down a lighted torch. An unattended lighted torch may cause burns.
10. Never open acetylene valve more than 1 to 1 ½ turns and leave the shut-off wrench in position at all times in case the tank must be turned off quickly
11. Welding or cutting galvanized metal will produce poisonous fumes
12. Before welding a container that may have held a flammable material, it should be steam cleaned and filled with water

ARC WELDER

Do not operate this machine until you have received instructions on its proper use and you understand all items on this sign.

1. Use proper shade lenses – shade 10 to 12
2. Wear protective clothing
3. Assume that all metal in the area is Hot until you have tested it
4. There is a possibility of being shocked if you are wet, standing on wet floors, or if the welder has loose connections
5. Make sure the welding area is free of combustible material
6. Make sure exhaust fan is running before starting to weld
7. Welding galvanized metal or surfaces painted with lead base paints produces poisonous fumes
8. Warn persons nearby before striking arc
10. Before welding containers which may have held combustible materials, steam clean them and fill with water
11. Wear eye protection while chipping
12. Do not throw electrode stubs on floor because of slipping hazard

STATIONARY BELT SANDER

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection
2. Use the lower half of the wheel
3. Do not use the machine if part of the belt is worn away. This will damage the rubber wheel.
4. Use pliers or vise grips for holding small stock
5. Do not use too much pressure. Pushing too hard on the wheel may cause you to lose your balance and fall toward the wheel.
6. Do not talk to anyone while operating this machine

PORTABLE CIRCULAR SAW

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection
2. Use only sharp blades
3. Always check location of power cord before starting the cut so cord is not in blade path
4. Make sure you have good footing and are well balanced
5. Use both hands on the saw
6. Clamp small pieces. Do not attempt to hold them with one hand and saw with the other.
7. Make sure guard is in proper place before laying the saw down after a cut
8. Make sure saw is unplugged before changing blades or making adjustments
9. Make sure blade guard is in good operating condition
10. Be sure ports are open to avoid overheating motor
11. Never try to support a piece of lumber with your leg or knee while sawing. Leg cuts are a common injury.

METAL CUT-OFF WHEEL

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection
2. Make sure stock is securely clamped in vise
3. Maintain enough pressure so as to cut rapidly, but not so much as to stop the machine
4. Keep hands away from wheel
5. Do not attempt to catch metal which is being cut off. The metal will be hot.
6. Do not attempt to cut more than one piece of metal at a time
7. Check disc of damage before each use

DRILL PRESS

Do not operate this machine until you have received instructions on its proper use and you understand all items on this sign.

1. Wear eye protection
2. Use sharp drill bits only
3. Clamp your work - loose metal can cause serious injury
4. Remove chuck key before drilling
5. Place work on wood to prevent damage to table
6. Use proper speed: Slow speeds for large drills
 Fast speeds for small drills

Drilling speeds for steel in revolutions per minute

Drill Diameter	Carbon steel drill	High speed drill
1/4	458	917
1/2	229	458
3/4	153	306

7. Place long end of piece being drilled to your left so that if it happens to slip, it will not strike operator
8. Do not wear gloves, loose fitting clothing or jewelry
9. Never grab metal spirals - they may cause serious cuts
10. Do not allow anyone around you while drilling
11. If you have long hair, wear a hat or tie the hair back
12. Use slower feed when breaking through material

FLOOR SHEAR

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Never get hands close to cutting edges
2. Be cautious about sharp edges on metal after it is sheared
3. Do not leave the handle of the shear in the down position. This will cause tripping.
4. Do not cut more than one thickness of metal at a time.
5. Do not cut metal which is too heavy for the shear. This shear is designed to cut metal no more than _____ inches thick.
6. Do not cut hardened steel such as car spring
7. Shear blades should make close contact with each other through the duration of the cut

FORGE

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection
2. When lighting the forge, turn on the gas first, then the air
3. When turning off the forge, shut off the gas first, then the air
4. When the forge is not in use, use a gate valve ahead of the electric valve to shut off the gas
5. Assume that all metal is Hot in this area until you have tested it
6. Make sure tongs fit the work piece securely
7. Be sure hammer handles are in good shape and securely fastened to hammer heads
8. Do not strike the face of an anvil with a hammer. This can cause serious injury from flying chips of metal from the hammer.
9. When using a hot cutter or hardie, make sure everyone in the area knows you are cutting metal and the metal may fly.

BENCH GRINDER

Do not operate this machine until you have received instructions on its proper use and you understand all items on this sign.

1. Wear eye protection
2. Tool rests should be as close as possible to grinding stones without touching them
3. After installing a new wheel, stand to one side and let the grinder run a full minute before using it
4. Do not grind on the side of the wheel. Side pressure may cause the wheel to break.
5. Keep fingers away from wheel. Use pliers for holding small pieces.
6. Keep stones dressed and trued. A shiny surface indicates a dull wheel. Vibration indicates out-of-roundness.
7. Do not use a stone that is worn down to $\frac{1}{2}$ of its original diameter

HYDRAULIC JACK

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Make sure the jack is capable of lifting the load
2. Check lift points carefully to avoid damage to the item being lifted and to the jack
3. When working under lifted objects, support the objects with jack stands and lower the jack.
Never work under anything which is supported only by the jack.
4. Never leave an object supported only by a jack

HYDRAULIC PRESS

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection
2. Make all adjustments before pressure is applied to work
3. Do not attempt to hand hold the work
4. Make sure everyone in the area knows you are using the press and that there is danger from flying metal
5. Stand behind the end of the press to avoid flying metal
6. Stop periodically to inspect the work to make sure everything is all right
7. Always remove pressure before leaving the area
8. Always use sufficient supports, clamps, or other devices to hold and support the work evenly

JOINTER

Do not operate this machine until you have received instructions in its proper use and understand all items on this sign.

1. Wear eye protection
2. Keep the guard over the blades and in good working order
3. Keep blades sharp
4. Always disconnect power when checking or removing blades
5. Limit the depth of cuts to 1/16"
6. Avoid jointing pieces shorter than 12 inches
7. Use a push stick for jointing pieces less than 2 inches wide
8. Get help before jointing the edge or face of long pieces
9. Do not use the jointer for stock containing knots, splits, paint, or nails
10. The jointer is designed for smoothing the edges of boards. It is not made for planing the flat sides or the ends of boards.
11. Be sure the fence is clamped in place
12. The stock should be run through with the grain, not against it

METAL LATHE

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection
2. Remove chuck key as soon as you finish loosening or tightening chuck. This habit will prevent the lathe from being turned on with the key still in the chuck.
3. Always revolve chuck by hand before turning on the power
4. Do not wear gloves, rings, or loose clothing
5. Always roll up sleeves
6. Keep cutting tool away from stock until machine is turned on
7. Always check automatic feed to determine its direction before starting a cut
8. Never reach over the rotating chuck
9. Do not touch revolving work or attempt to pull off cuttings
10. Do not attempt to change gears while lathe is running
11. Do not lean against machine

MIG WELDER

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear dry gloves and coveralls while operating this machine. More splatter or molten metal will be experienced than with ordinary arc welders.
2. Electrode should be touched to work very lightly before starting to weld. Excess pressure may cause electrode to coil inside of cable.
3. Do not touch electrode to bare skin. Since electrode is not coated, it may cause shock.
4. Be sure gas is turned on before starting to weld
5. Do not lay the torch on the welder
6. Periodically clean the torch nozzle. Excess pile up of splatter can stop the electrode feed and cause it to coil up inside the cable.
7. Keep the cable as straight as possible while welding to prevent binding the electrode
8. Keep eyes shielded after the weld is completed. Small pieces of slag explode from the weld as it cools.

PLANER

Do not operate this machine until you have received instruction on its proper use and understand all items on this sign.

1. Wear eye protection
2. Do not wear loose fitting clothing
3. Keep guards in place and in good working order
4. Check stock for loose knots and nails before planing
5. Use only sharp blades
6. Keep hands away from material nearing feed rolls
7. Never plane stock which is shorter than 2 feet, longer than the distance between the feed rolls or less than 1/4 inch thick
8. Never plane stock of different thicknesses; this can result in kickback
9. Do not overload the machine by taking too deep a cut
10. When shutting down, do not leave the machine until it has come to a complete stop

PORTABLE DRILLS

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection
2. Use only sharp drills
3. Avoid wearing loose clothing
4. Remove chuck key before drilling
5. Keep a firm grip on the drill. Be alert to the possibility of the bit catching and throwing you off balance.
6. Do not lock the switch in the “ON” position while the drill is being held with the hands
7. Use less pressure when breaking through the stock
8. Do not use bits larger than specified by the chuck size. This will cause overloading of the drill motor.
9. Be sure that stock being drilled is securely fastened before drilling
10. Use a center punch before starting to drill
11. Do not let drill bit spin in hole without cutting

PORTABLE DISC GRINDER

Do not operate this machine until you have received instructions on its proper use and you understand all items on this sign.

1. Wear eye protection
2. See that other workers are out of range or are wearing eye protection
3. Do not lay the grinder down until it comes to a complete stop
4. Make sure you are balanced and have good footing
5. Hold the grinder firmly with both hands at all times
6. Check the location of the power cord at all times to avoid cutting it
7. Check for cracked or glazed grinding wheels frequently
8. Use the left-hand portion of the disc so the particles will fly away from you

RADIAL ARM SAW

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection
2. Use only sharp blades
3. Keep the table clean
4. Do not wear gloves, rings, or loose clothing
5. Always use anti-kickback fingers while ripping
6. Do not stand with your face directly in line with the blade
7. Check rotation of blade before ripping. The board should be pushed in against the rotation of the blade.
8. For cross cutting, the blade rotates down from the operator and the saw is pulled forward slowly. Cutting too fast may cause the saw to climb the board or stall.
9. Adjust blade so that it will be about 1/16" below the surface of the table

STEAM CLEANER

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Make sure water is flowing through the cleaner before lighting the burner
2. Check electrical connections so that they will not get wet and cause shocks while the steam cleaner is being used
3. Hold the hose by the insulated handgrip and wear gloves to prevent burns
4. Make sure everyone in the area is aware that hot water and steam are being used
5. Be sure the safety blow-out plug is pointed toward the floor
6. Be sure to keep a constant supply of water flowing into the steam cleaner
7. Do not operate the cleaner unless water droplets are emitted with the steam
8. When shutting down, turn off the burner and leave water flowing until it is cool, then turn off water. Do not leave until it is completely shut down.

TABLE-TYPE BAND SAW

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Make sure stock is securely clamped in vise
2. If saw teeth wear off unusually fast, reduce the speed
3. Keep moving parts lubricated
4. Keep hands away from blade while cut is being made
5. Keep adjustable blade guides as close as possible to the stock
6. Keep proper tension on blade
7. Place metal in saw in the proper position. When sawing angle iron, place both legs down, when sawing rectangular stock, place the widest side toward the saw blade.
8. When cutting short metal, place another piece of metal of equal width in the opposite end of the vise jaws. This will provide good grip on the metal being cut.
9. Gently lower the blade when starting the cut
10. Do not press down on the saw while it is cutting
11. Do not leave saw unattended while it is running

TABLE SAW

Do not operate this machine until you have received instructions on its proper use and you understand all items on this sign.

1. Wear eye protection
2. Use only sharp blades
3. Keep table clean
4. Do not wear gloves, rings, or loose clothing
5. Always use the guard for cross cutting and ripping
6. Use the rip fence for ripping and the miter gauge for cross cutting. Never attempt to use the rip fence and the miter gauge at the same time.
7. The blade should be adjusted so that it protrudes no more than 1/4" above work
8. Never allow your fingers too close to the saw blade. Use a push stick.
9. Do not attempt to clear the table of scraps while the saw is running
10. Do not stand with your face directly in line with the saw blade
11. Make sure saw is disconnected from the power source while changing blades and making adjustments

TIG WELDER

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear dry gloves and coveralls while operating this machine
2. Touching the electrode to bare skin may cause shock
3. Be sure gas is turned on before starting to weld
4. On water cooled torches, keep a constant watch for leaks in the line. Wet cables or floors lead to shocks.
5. A 2% solution of silver nitrate will turn magnesium black and will not affect aluminum. Magnesium will burn if overheated. If a magnesium fire is experienced, discontinue the arc, but keep the inert gas directed on the flame until the fire is extinguished.
6. Do not turn off welder until the time delay switch has shut off the flow of gas
7. Do not lay the torch on the welder
8. Touching the electrode on the work piece, using too small a nozzle or insufficient gas pressure, or using too long an arc will cause black welds
9. Clean metal with a grinder or wire brush that is used for aluminum only

UPRIGHT BAND SAW

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Use only sharp blades
2. Do not wear gloves, rings, or loose clothing
3. Keep both hands on the same side of the blade while pushing work through the saw. This will prevent binding.
4. Do not allow fingers any closer than 2 inches from the blade. Keep hands to one side of the blade. Use a push stick.
5. Do not reach around and attempt to pull stock through the saw
6. Saw guide should be no more than $\frac{1}{2}$ " above stock being cut
7. Use vise grips to hold round stock. Round stock tends to twist and may break the blade or cause it to fly off.

POWER WIRE BRUSH

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear eye protection - wires from the wheel could lodge in your eye
2. Do not wear gloves, rings or loose-fitting clothing
3. Hold work at or below the center of the wheel. Any object caught by the wheel will then be thrown down.
4. Use pliers to hold small objects to be brushed
5. Do not use excessive pressure

WOOD LATHE

Do not operate this machine until you have received instructions on its proper use and understand all items on this sign.

1. Wear proper eye protection
2. Do not wear gloves, rings, or loose clothing
3. Always roll up sleeves
4. Make sure tail stock is securely locked in place
5. Allow all glued work to set properly before turning
6. Rotate the work by hand before turning on power
7. Hold lathe tools securely with both hands
8. Keep lathe tools sharp
9. Always stop machine before measuring stock
10. Keep the tool rest as close as possible to the work
11. Turn large diameter objects at slow speeds
12. Remove tool rest when sanding or finishing